

**ECF No. 281-12, Exhibit 7 to Plaintiffs' Mot. for Class
Certification**

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Exhibit 7

**UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF CALIFORNIA**

DZ Reserve and Cain Maxwell (d/b/a Max
Martialis), individually and
on behalf of others similarly situated,

Plaintiffs,

v.

FACEBOOK, INC.,

Defendant.

Case No.: 3:18-cv-04978

Expert Reply Report of Charles D. Cowan, Ph.D.

March 19, 2021
San Antonio, TX

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I. INTRODUCTION, ASSIGNMENT, SUMMARY OF CONCLUSIONS

1. I, Dr. Charles Cowan, was retained by Cohen Milstein Sellers & Toll PLLC, counsel for the Plaintiffs, to develop a methodology for estimation of the inflation of measures of Potential Reach provided by Facebook to the named Plaintiffs and each advertiser in this case. On December 22, 2020 I submitted my expert report in this matter. Since submitting my report, I have not testified in any matters at trial. My CV is changed with the addition of an updated publication and I have been deposed in other cases. A revised CV and an updated summary of past testimony are provided as Exhibits 1 and 2 to this report. I am still being compensated for my work in this matter at a rate of \$775 per hour. No part of my compensation depends on the outcome of this litigation.

2. On March 3, 2021, Defendant Facebook, Inc.'s ("Facebook") expert Dr. Steven Tadelis submitted his rebuttal report, in which he performed additional analysis relying on new information from off-the-record conversations with Facebook employees two months after I submitted my report. Tadelis Report ¶ 93, fn. 204. In particular, Dr. Tadelis criticizes my reading of FB-SINGER-00258878, which showed that Potential Reach was higher than Monthly Active Users (MAU). Cowan Report at ¶ 33. I understand that the author of the document, David Amsallem was questioned in a deposition about the document's meaning and context but claimed to have no memory of it. *See, e.g.*, Amsallem Dep. at 204:17-205:23. Thus, in the absence of any additional insight from Mr. Amsallem about FB-SINGER-00258878, I interpreted the measure of inflation evidenced by the document to be the static difference between Potential Reach and MAU.

3. Two months after I submitted my report Mr. Amsallem had an off-the-record conversation with Dr. Tadelis and Mr. Hanegby, on which Dr. Tadelis relies in criticizing my reading of the document. *See* Tadelis Report at ¶ 93 fn. 204. As a result of this private conversation, Dr. Tadelis states that the discrepancy between Potential Reach and MAU is

due to differences between the *data tables* used to calculate Potential Reach and MAU¹. Tadelis Report at ¶ 93. To date, Facebook has not provided me with the transcript of this conversation (or other such conversations cited throughout Dr. Tadelis' report). I had no knowledge of the substance of this conversation prior to submitting my December 22, 2020 report, as it took place on February 23, 2021.

4. In light of this new information in Dr. Tadelis' report, I reviewed additional documents regarding the data tables, including Dr. Atif Hashmi's reply report. Dr. Hashmi also responds to new information in Dr. Adam Porter's report, including additional off-the-record conversations with Facebook employees. Based on the reference to the [REDACTED] in these reports, I reviewed FB-SINGER-00426455, which detailed active user accounting and disabled accounts in MAU.²

5. To incorporate this information, I derived a way to account for temporal variations in this source of inflation. Based on the FB-SINGER-00426455 discussion of disabled accounts, I adopted publicly available information regarding disabled accounts and

¹ Because these accounts still represent the difference between MAU and Potential Reach, I will continue to refer to them as Inactive accounts.

² I understand that Facebook uses the term "active" to refer to accounts that sent an ad request or received an ad impression in the past 30 days. Tadelis Report at ¶ 90. However, just because an account is "active", does not mean it is appropriate to report as MAU. For MAU, [REDACTED]

[REDACTED] SINGER-00426455 at '56. When MAU is generated, [REDACTED]

[REDACTED] I . Dr. [REDACTED]

[REDACTED] See *id.*; FB-SINGER-00258878 at '81.

calculation of MAU on Facebook's Transparency portal.³ The portal contains information regarding temporal variation in disabled accounts.

6. In addition, Dr. Tadelis criticizes my report because Facebook purportedly eliminated one source of inflation – Ineligible accounts – in March 2019, and he suggests that inflation would fall below the thresholds I found as a result. Tadelis Report at ¶¶ 80, 86. As I explained in my report, I applied my methodology to 2018 (for which Facebook produced targeting data) to demonstrate that I can calculate the inflation rate for any advertiser in the class across any targeting specification. Furthermore, I demonstrated that my findings regarding Potential Reach inflation are robust through various sensitivity analyses that eliminated the Ineligible account inflation. See Cowan Report, Appendix 11. Nevertheless, to rebut Dr. Tadelis' criticism, I more broadly apply the methodology in my opening report to the post-March 2019 time period to demonstrate that inflation levels still reach the thresholds I found in my report.

7. In sum, in response to the new information contained in Dr. Tadelis' report, and based on Facebook's documents and the Transparency portal⁴, I adjusted the value of two variables in my Potential Reach inflation equation—Inactive accounts and Ineligible accounts (post-March 2019)—and used the exact same methodology as detailed in my opening report to calculate Potential Reach inflation.

8. Based on the application of my existing methodology, I continue to find inflation in Facebook's Potential Reach:

- a. Between Q1 2014 and Q4 2018, the initial default Potential Reach provided to advertisers in the U.S. was inflated by 37.4%-49.6%;

³ <https://transparency.facebook.com/community-standards-enforcement#fake-accounts>

⁴ See Exhibit 3, Additional Materials Relied Upon for Reply Report

- b. Between Q1 2019 and Q4 2020, the initial default Potential Reach provided to advertisers in the U.S. was inflated by 35.8%-53.4%;
- c. If an advertiser receives a Potential Reach of 1000 or above, regardless of the targeting criteria used, it is a statistical certainty that their Potential Reach is inflated by at least 10%;
- d. Plaintiff Maxwell's Potential Reach was inflated at a minimum of 1.302 up to a maximum inflation of 1.409 and the likelihood that Potential Reach inflation was less than 10% is at most 1 in a trillion. Plaintiff DZ Reserve's Potential Reach was inflated at a minimum of 1.266 up to a maximum inflation of 1.488, and the likelihood that DZ Reserve received less than 10% inflation is at most 1 in 10 quadrillion.

II. ANALYSIS

A. *Calculation of US Potential Reach Inflation Using My Existing Methodology*

9. I can calculate the US Inactive rate over time using the relationship between the US Inactive rate in January 2018 from Facebook's documents, and the number of accounts Facebook periodically removes before calculating MAU as described below.

10. In January 2018, there were [REDACTED]

[REDACTED] -SINGER-00258878 at '79; FB-SINGER-00426455 at '56.

This means that in January 2018, the US Potential Reach was inflated by [REDACTED]

11. Facebook's Transparency portal shows that worldwide Facebook disables millions and billions of accounts "that are fake and engaged in abusive behavior" before they ever become part of MAU. After these accounts are disabled, according to the Transparency portal the resulting MAU is still comprised of 5% Fake accounts. For this reason, while

Facebook refers to these disabled accounts as “fake” they are distinct from the 5% Fake rate reported in the SEC. Because Facebook’s MAU excludes accounts that are disabled, I understand that the accounts reported as disabled on the Transparency portal are [REDACTED]

12. I note that the accounts [REDACTED]

[REDACTED] FB-SINGER-00426455 at '57.

The 583M accounts Facebook disabled worldwide in Q1 2018 before calculating MAU are not directly proportional to the [REDACTED]

[REDACTED] represents both the US portion of the [REDACTED]

13. I can use the rate of the worldwide disabled accounts from the Transparency portal, to extrapolate and backcast the rate of Inactive accounts in the US over time. In the absence of any additional information from Facebook, I make the assumption that (a) the ratio of US disabled accounts to worldwide disabled accounts remains more or less the same over time and (b) the ratio of US disabled to US Inactive accounts remains more or less the same over time. This assumption is reasonable and conservative because while the number of disabled accounts may fluctuate from quarter to quarter, the activity of disabling accounts would be pursued with the same diligence regardless of country, as there is no indication from Facebook that they focus their cleaning activities more on one country than another. Should Facebook provide additional information, I can use it with the same approach I describe below.

14. First, because Facebook's Transparency portal only reports the number of accounts disabled worldwide starting in Q4 2017, I backcast the numbers to 2014 by quarter using a regression. See **Appendix A, Tab 3**.

15. Second, using the actual and backcast rates of disabled accounts, I determine the percentage the worldwide disabled accounts represent compared to the worldwide MAUs over time as reported in the SEC filings using the formula: $(D/3) / ((D/3) + MAU)$, where D = number of worldwide disabled accounts in a quarter (to put these on the same scale as the monthly active users, I divide by 3). See *id.*

16. Third, I use the resulting rate of increase in the percentage of accounts Facebook disables worldwide to ratio adjust the corresponding percentages of disabled accounts in the US Potential Reach over time. See *id.* & **Appendix A, Tab 4**.

17. Fourth, I use (a) the resulting percentages of US disabled accounts over time and (b) the [REDACTED] US Inactive rate in January 2018 to scale the US Inactive rate over time from 2014 through the present. **Appendix A, Tab 3**.

18. Fifth and finally, using the resulting US Inactive rates over time, I calculate the US Potential Reach inflation rates over time using equation 7⁵ from my opening report, but with (a) Inactive rates over time based on new information about Inactives, and (b) the Ineligible accounts removed as a source of inflation starting in 2019⁶, in response to Dr. Tadelis' critique (in ¶ 86). **Appendix A, Tab 5**.

19. The result is that prior to 2019, the initial default Potential Reach provided to advertisers in the U.S. was inflated by 37.4%-49.7%. Starting in 2019, the initial default

⁵ $Inflation = \frac{[(\%FB)*k + (\%FB\&IG)*\%DedupOverlap + (\%IG\sim FB)]}{(1-f)*(1-g)*(1-v)}$

⁶ Facebook changed the eligibility criteria on March 12, 2019. Thus, for nearly all of Q1 2019, which reports through March 31, 2019, Ineligibles were present. However, to be very conservative I removed Ineligibles from the inflation calculation starting in Q1 2019.

Potential Reach provided to advertisers in the U.S. (which no longer contained Ineligible accounts) was inflated by 35.8%-53.4%.

B. My Existing Methodology Continues to Show that Potential Reach Has Been and Remains Inflated by at Least 10% at Convergence Thresholds

20. Next, I used the US Inactive rates described above to calculate the quarterly Potential Reach inflation rates by country and age group in Appendix 2 of my opening report. Again, I applied the exact same methodology as described in § VI.D of my report⁷, adjusting the value of Inactive accounts and removing Ineligibles starting in 2019. The results of these calculations on a quarterly basis are in **Appendix 1, Tab 1**.

21. Based on **Appendix 1, Tab 1**, (excluding countries where there are fewer than 1000 people who could be targeted) the lowest inflated demographic for each quarter between 2014 through 2018 is Norway ages 45-49; the lowest demographic between 2019 and the present is the Faroe Islands ages 30-34. Again, for some perspective, according to Facebook's data, of all the ads that ran in 2018 and had a Potential Reach value, only 48 were targeted exclusively at Norway, ages 45-49 (out of hundreds of millions of ads), and none were targeted exclusively at the Faroe Islands, ages 30-34. For both these demographics, the likelihood that when Potential Reach is 1000, the Potential Reach inflation is at least 10% is *at minimum* over 99.99%. Thus, for any advertiser who receives a Potential Reach of 1000 or above, regardless of the targeting criteria used, it is a statistical certainty that their Potential Reach is inflated by at least 10%.

⁷ $Inflation = \frac{SUMA}{(1-f)(1-g)(1-v)}$

C. Calculating Plaintiffs' Potential Reach Inflation with my Existing Methodology

22. Using the exact same methodology described in my report (see Cowan Report at § VII.C.2) and adjusting the Inactive and Ineligible variables' values as described above (see **Appendix 1, Tabs 1, 2, & 5**), in **Appendix B** I calculated that Plaintiff Maxwell's Potential Reach was inflated by a minimum of 1.302 up to a maximum inflation of 1.409 and the likelihood that he did not receive at least 10% inflation is 1 in a trillion. In **Appendix C** I calculated that Plaintiff DZ Reserve's Potential Reach was inflated by a minimum of 1.266 up to a maximum inflation of 1.488 and the likelihood that DZ Reserve did not receive at least 10% inflation is 1 in 10 quadrillion.⁸

March 19, 2021

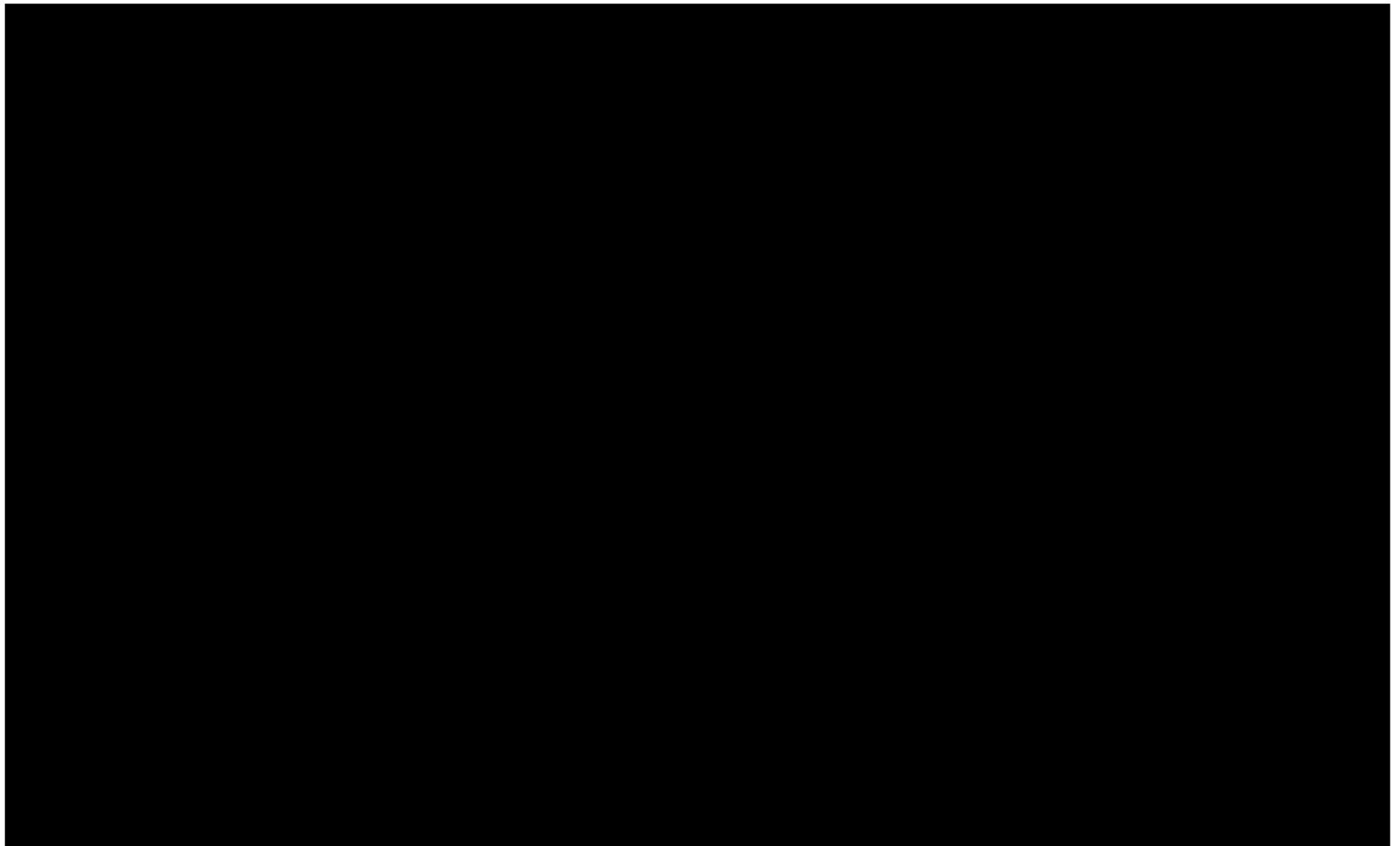


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⁸ As I did in my opening report, I further demonstrate the applicability of my methodology by applying my analysis to three random ad sets from 2018 (see Cowan Report, Appendix 15) in **Appendix D**.

Appendix A, Tab 4

Inactive Rate: Actual and Modeled Over Time



—●— Actual Data — Modeled